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### IMPROVED ELEMENTS AND EPHEMERIS OF COMET 1887 *e*,

BY S. C. CHANDLER, JR.

The ephemeris below is designed to follow this comet until its disappearance. Probably position-measurements will not be practicable with instruments of moderate size much after the middle of August; but with the more powerful telescopes the comet ought to be followed well into September, perhaps to the end.

For the convenience of computers and others desirous of making comparison with observations, I have continued the ephemeris from the last date of that in No. 157 of the *Journal*, but have based it upon the following improved elements.

$$\left. \begin{aligned} T &= \text{June } 16.65526 \text{ Greenw. M.T.} \\ \omega &= 15^\circ 7' 30''.3 \\ \Omega &= 245 \ 12 \ 59.3 \\ i &= 17 \ 35 \ 22.1 \end{aligned} \right\} \text{Eq. } 1887.0$$

$$\log q = 0.1445436$$

These elements were computed from the normals for May 14 and May 30, given in No. 157, conjoined with the follow-

ing, also corrected for parallax and aberration, and referred to the mean equinox 1887.0.

Obs.	Greenw. M.T.	$\alpha$	$\delta$
June 8-14	4	June 12.16667 <sup>h</sup> 16 <sup>m</sup> 10 <sup>s</sup> 16.69	<sup>o</sup> -8 57' 40.7''
July 12	4	July 12.65023 17 18 3.59	+6 46 54.9

The representation of the middle places (C-O)

	May 30	June 12
$\Delta \lambda \cos \beta$	-17''.2	-18''.7
$\Delta \beta$	- 2 .3	-12 .5

is not susceptible of improvement by varying the ratio of the distances. Therefore if the places employed are correct, of which I cannot entirely assure myself at the time and place of writing, the orbit will prove to be sensibly elliptical.

CONSTANTS FOR THE EQUATOR, 1887.0

$$\begin{aligned} x &= r [9.9830063] \sin [349^\circ 16' 52''.7 + v] \\ y &= r [9.9844119] \sin [254 \ 49 \ 1.7 + v] \\ z &= r [9.5800008] \sin [303 \ 14 \ 9.6 + v] \end{aligned}$$

#### EPHEMERIS FOR GREENWICH MIDNIGHT.

1887	App. $\alpha$	Hourly Motion	App. $\delta$	Hourly Motion	log $r$	log $\Delta$	Light	
July	9.5	17 11 <sup>m</sup> 20.26	+5 56 1.5	+44.48	0.156506	9.702606	1.01	
	11.5	15 37.59	5.336	39.39				
	13.5	19 52.55	5.287	34.50	0.160867	9.723873	0.90	
	15.5	24 5.11	5.238	29.95				
	17.5	28 15.37	5.191	25.59	0.165804	9.745885	0.79	
	19.5	32 23.40	5.145	21.47				
	21.5	36 29.28	5.101	17.62	0.171270	9.768426	0.70	
	23.5	40 33.11	5.059	14.02				
	25.5	44 34.96	5.019	10.69	0.177216	9.791322	0.61	
	27.5	48 34.96	4.981	7.61				
	29.5	52 33.11	4.942	4.76	0.183591	9.814430	0.53	
	31.5	17 56 29.42	4.905	2.17				
	Aug.	2.5	18 0 23.94	4.867	- 0.22	0.190346	9.837641	0.46
		4.5	4 16.70	4.832	2.39			
		6.5	8 7.79	4.797	4.37	0.197431	9.860881	0.40
8.5		11 57.25	4.765	6.17				
10.5		15 45.20	4.734	7.78	0.204803	9.884102	0.35	
12.5		19 31.75	4.706	9.23				
14.5		23 16.97	4.680	10.52	0.212414	9.907261	0.30	
16.5		27 1.03	4.657	11.65				
18.5		30 44.01	4.636	12.62	0.220226	9.930327	0.26	
20.5		34 26.04	4.616	13.46				
22.5	38 7.16	+4.598	-14.16	0.228199	9.953259	0.23		

1887	App $\alpha$	Hourly Motion	App. $\delta$	Hourly Motion	$\log r$	$\log \Delta$	Light
Aug. 24.5	18 <sup>h</sup> 41 <sup>m</sup> 47.46 <sup>s</sup>	+4.581	+7 <sup>o</sup> 39 <sup>'</sup> 48.2 <sup>''</sup>	-14.73			
26.5	45 26.95	4.565	7 27 49.9	15.18	0.236301	9.976022	0.20
28.5	49 5.67	4.549	7 15 32.4	15.53			
30.5	52 43.61	4.532	7 3 0.7	15.78	0.244498	9.998585	0.17
Sept. 1.5	56 20.75	4.516	6 50 19.4	15.93			
3.5	18 59 57.13	4.500	6 37 32.6	16.01	0.252763	0.020923	0.15
5.5	19 3 32.76	4.485	6 24 43.9	16.01			
7.5	7 7.66	4.470	6 11 56.7	15.97	0.261070	0.043022	0.13
9.5	10 41.88	4.456	5 59 13.9	15.82			
11.5	14 15.46	4.443	5 46 38.6	15.64	0.269398	0.064868	0.11
13.5	17 28.45	4.431	5 34 13.6	15.40			
15.5	21 20.87	4.421	5 22 1.4	15.10	0.277726	0.086446	0.10
17.5	24 52.80	4.410	5 10 4.6	14.76			
19.5	28 24.23	4.400	4 58 25.3	14.37	0.286037	0.107734	0.09
21.5	31 55.20	4.390	4 47 6.0	13.93			
23.5	35 25.66	4.379	4 36 8.3	13.47	0.294316	0.128710	0.08
25.5	38 55.62	4.369	4 25 33.6	12.97			
27.5	42 25.07	+4.358	+4 15 24.1	-12.43	0.302552	0.149356	0.07

Gloucester, Mass., 1887 July 28

Subsequent to the preparation of the foregoing ephemeris a computation of elliptic elements was made with the normal places of May 14, June 12, and July 12, as follows:

ELEMENTS.

$T =$  June 16.66108 Greenw. M.T.  
 $\omega = 15^{\circ} 8' 3.7''$   
 $\Omega = 245^{\circ} 13' 16.8''$   
 $i = 17^{\circ} 32' 53.4''$   
 $\log q = 0.1441634$   
 $\log a = 2.5009248$   
 $e = 0.9956014$

The corresponding constants for the equator (1887.0) are:—

$$\begin{aligned} x &= r [9.9830852] \sin [349^{\circ} 18' 2''.6 + v] \\ y &= r [9.9843660] \sin [254^{\circ} 50' 26''.1 + v] \\ z &= r [9.5797903] \sin [303^{\circ} 9' 11''.7 + v] \end{aligned}$$

The corrections to the previous ephemeris necessary to represent these later elements are given in the following table:

July 9.5	-0.23	+ 4.3	Aug. 6.5	+1.56	-35.7	Sept. 3.5	+3.81	-71.4
11.5	-0.12	+ 1.6	8.5	1.70	38.6	5.5	3.98	73.4
13.5	-0.01	- 1.0	10.5	1.84	41.5	7.5	4.16	75.3
15.5	+0.12	3.7	12.5	1.98	44.4	9.5	4.34	77.1
17.5	0.24	6.5	14.5	2.13	47.3	11.5	4.52	78.8
19.5	0.36	9.3	16.5	2.28	50.0	13.5	4.70	80.3
21.5	0.49	12.1	18.5	2.43	52.7	15.5	4.89	81.8
23.5	0.62	14.9	20.5	2.59	55.2	17.5	5.07	83.2
25.5	0.75	17.8	22.5	2.76	57.8	19.5	5.26	84.5
27.5	0.88	20.8	24.5	2.93	60.2	21.5	5.45	85.7
29.5	1.01	23.8	26.5	3.10	62.6	23.5	5.64	86.8
31.5	1.14	26.8	28.5	3.28	64.9	25.5	5.83	87.8
Aug. 2.5	1.28	29.8	30.5	3.46	67.2	27.5	+6.03	-88.8
4.5	+1.42	-32.8	Sept. 1.5	+3.63	-69.3			

The only later observations to which I have access, namely, those of Mr. BARNARD, in another part of the Journal, show a much closer accordance with the ephemeris after applying these corrections. Thus, for July 26 the differences ( $O-C$ )

$\Delta\alpha = +1''.84$ ,  $\Delta\delta = -31''.3$ , are reduced to  $+0''.92$  and  $-11''.9$ . This confirms the correctness of the normal places, and strengthens the probability of the existence of a real deviation from the parabola.

1887 August 21.